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THE

# TEACHERS' COMPANION

TO THE

# AMERICAN DRAWING-SLATES

## AND CARDS.

No. 1.—FREE-HAND DRAWING
No. 2.—MODEL AND OBJECT DRAWING

ELEMENTARY AND ADVANCED

BY

WALTER SMITH, ART MASTER
SOUTH KENSINGTON, LONDON

GENERAL SUPERVISOR OF DRAWING IN THE PUBLIC SCHOOLS, BOSTON, AND STATE DIRECTOR OF ART EDUCATION, COMMONWEALTH OF MASSACHUSETTS

BOSTON
NOYES, HOLMES, AND COMPANY
1872

THE

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# AMERICAN DRAWING-SLATES

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### No. 1.—FREE-HAND DRAWING

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# INTRODUCTION.

THIS little work is intended to assist the teacher who has to give instruction in drawing by use of the American Drawing Slates and Cards. The proportions of the various figures are stated when these are simple, and if more complicated, the general proportions are suggested.

The teacher should remember that every illustration should be drawn by the pupil as *large as the slate or paper will allow*, the copies being merely guides for proportion and not for size. It is intended that the teacher should make a fair sketch upon the black-board, before the class, of the subject taken up at each lesson, and explain the proportions of the parts, especially of the constructional lines. The small copies will then give the details accurately drawn for imitation.

The definitions of plane geometry, illustrations of which are employed as a basis of Free-hand Drawing, should be given to and repeated by the class, however young the pupils may be, and the meanings explained, not so much by scientific terms as by drawings of accurate and inaccurate illustrations on the board. Copies may be repeated as often as writing lessons, only instead of repeating them on the same page many times, the whole series of lessons should be gone over once, and then be begun again from the first, with a better understanding and increased skill. The one thing to avoid in teaching drawing to children, is wearying them by repe-

tition of uninteresting elementary work. They have no appreciation of abstract truths, or the hard words in which such truths are expressed; but the sensitiveness and receptiveness of young children for visible shapes is very keen, and probably their understandings may be reached through the sense of sight sooner than by appeals to either of the other senses or by reasoning explanations. Geometric accuracy in Free-hand or Model Drawing cannot be expected from any one; the standard by which the efforts of little children are to be judged should therefore be a very merciful one; and mechanical measurements should be allowed and insisted upon by the teacher, so that each scholar may test his or her own work, and educate the eye by correcting imperfect results. This should be used judiciously, not as a substitute for judgment by the eye, but as a test and corrective to inexperience; and methods of testing the truthfulness and accuracy of the geometric features of a drawing should be communicated to the pupils by the teacher as part of the regular instruction.

In drawing vertical and horizontal lines the slate or paper should be kept in one position in front of the pupil, its edges parallel with the edges of the desk; but in drawing curves it will be found necessary to allow the slate or paper to be placed in any position which the pupil may desire, *so that the hand may form the centre of the curve to be drawn*, which can only be secured in some cases by turning the drawing upside down, placing it sideways to the scholar.

It is suggested that the scholars leaving their slates at school, may be occasionally required to bring their drawing exercises to the teacher, done at home as memory lessons, in little books kept for that purpose. Some of

the best teachers say, "never draw a straight line if you have the means of ruling it," but I would say, it is better to draw straight lines than to rule them, unless it is absolutely essential for some special reason that they be mathematically straight, both because it is good practice for the eye and hand, and makes the pupil independent of rulers. The same may be said of drawing circles. Of course, if anything of importance depends upon a circle being round, it is best to use a pair of compasses to insure it, but a circle, *practically* round, may be drawn by the hand with very little experience, and it is educational to practice it. It will be found in practice, that it is more difficult to rule either vertical or horizontal straight lines than to draw them by the hand, relying upon the eye. A somewhat extensive experience in teaching and continued observation of the work of many pupils, have convinced me that those who draw, by free-hand, vertical and horizontal lines, make them generally more upright and level than those who shirk it and rule them. Those only draw well who draw intelligently, and that must come from the understanding. Every kind of geometric form, angles, triangles, quadrilaterals, polygons, simple and compound curves and proportions, must be known by name as well as sight, and their definitions be made familiar to the pupils, as well as their forms. An object or ornament should be sometimes analyzed by the teacher before a class, thus: "What parts are straight lines? What kind of a curve is this? Where is there a simple curve? Which is a compound curve? What sort of a compound curve is it? Are there any angles in the copy? What kind of angles? Can any one see a regular geometrical shape in the copy? What?" And before commencing a lesson it is well occasionally

to ask a bright pupil to describe the copy. Thus: "Exercise K. Subject, a vase. It is symmetrical, the two sides being alike seen in perspective, because the circular top and other circles on it appear as ellipses. The narrowest part is in the neck; the widest part is in the body about half way down from the top. The width of the mouth is rather greater than the width of the base. The outline, or profile, or contour of the vase is a compound curve, the upper part being the shortest and forms the neck, the lower part being a flat curve forms the body of the vase. There is no ornament on the vase, except the circular parallel lines upon it."

It is remarkable how few persons can describe accurately the forms of objects, or, indeed, the true form, size, proportion, color, and character, of anything the eye sees. People receive general impressions, which, brought to the test of description, are found to be vague and unreliable. Drawing, preceded by criticism and analysis of objects, in which well chosen terms accurately describe details, may be found (in correcting the vagueness of general impressions) to be educational even to the reasoning powers as well as the imitative and artistic. For this purpose lessons should be frequently given, dictated by the teacher from the desk, without illustration either in books, or slates, or on the board. Thus: "Draw a vertical line of six inches in the centre of your slates, leaving as much space at the top as at the bottom of the slates. Draw a horizontal line through its centre of the same length. These lines are the diagonals of a square. Draw it, and draw its diameters. On both sides of each diameter draw a simple curve, their heights equal to one fourth their bases. Draw the diagonals of four smaller squares, and divide

each into three equal parts. In each angle of the large square put a trefoil leaf, each foil pointed, the side points coinciding with the extremities of the diameters of the square, the middle foil with the extremities of the diagonals, by curves drawn from these extremities to the divisions of thirds on the diagonals of the smaller squares. In the centre of the square draw a circle of an inch in diameter. Make the stalks of the leaves grow out of this circle."

The geometric forms of common objects are even better suited than natural forms, for this sort of lesson, and houses of simple proportions may thus be dictated and drawn. When such an exercise has been given it is advisable also to require the children to write a full description of it, its proportions, size, etc., etc.

The object of this is to create in the minds of the pupils the realization that forms and words are interchangeable, both being mediums for the expression of ideas or thoughts; to use either language with equal facility, and to translate and retranslate one from the other. This exercise, begun upon simple geometric forms, may be pursued until the most elaborate irregular forms may be imagined and reproduced from dictation, if the language describing them be accurate and terse.

In sketching the illustrations on the blackboard, the teacher should treat the small diagrams as suggestions only of many like forms, and reproduce them to a scale of a foot for each half inch in the copy. Thus, a diagram of an inch and a half in height should be drawn three feet high; if an inch high, two feet on the board, and so on.

Clear, unbroken lines drawn by young pupils are rare, almost accidental; and lines varying in thickness

may be expected for a long while after commencement. In criticising their efforts, *form* only should be looked to at first, the actual shape, irrespective of beauty of workmanship, which is practically unattainable by beginners. But when form is perceived and expressed, then the teacher may begin to screw up the standard of the lines, and insist upon careful workmanship. To express it curtly, truth is the first essential, the manner of its presentation the second; and until the first is secured the less said about the second the better. We must first insist that a child shall tell us nothing but what is true, and then require him to express it in polite language.

Whilst appeals to the reasoning powers of young children should be avoided, it is advisable from the first to cultivate their understandings. Drawing depends upon two faculties — understanding and taste; skill being the result of practice or experience. It is of the utmost consequence that the first faculty should be developed in harmony with the second. Taste may be taken for granted; and the teacher's work is to base a pupil's exercise on the understanding of forms, and by frequent lessons to impart skill in execution. Short lessons often repeated are more influential than long ones at greater intervals. Four lessons per week of half an hour each, or six of twenty minutes each, would be a fair amount of time given to the subject for children under ten years of age. After that age the lessons may be longer and not so frequent, new subjects being taken up.

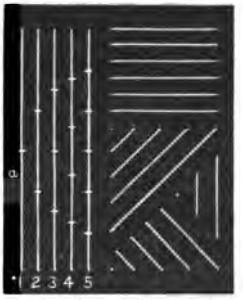
Drawing upon the blackboard should be practised every week by all the pupils, a section of the class taking their lessons at the board every time a lesson is given.

# FREE-HAND DRAWING.

## PART I.

### A.—Single Lines, Vertical, Horizontal, and Oblique Lines, and Parallel Lines.

First Exercise. Draw any vertical straight line. Mark equal distances of any length down the line from the top toward the bottom; then distances of a given length, as one inch, one and a half, and two inches. To be repeated on oblique and horizontal lines.




Second Exercise. *a*. To draw finite straight lines, and to divide them into equal parts. These lines may be either vertical, horizontal, or oblique. The illustrations given are vertical lines. No. 1, two equal parts; No. 2, three equal parts; No. 3, four equal parts; No. 4, five equal parts; No. 5, six equal parts. The parallel lines should be drawn from top to bottom or side to side of slate, the full length and width. In dividing a line into four equal parts, first divide it into two, and then each half into two; so also with lines into six or eight equal parts, first dividing them into two, and then subdividing each half into the number of parts required.

## B. — Two and Three Lines: Angles and Triangles.

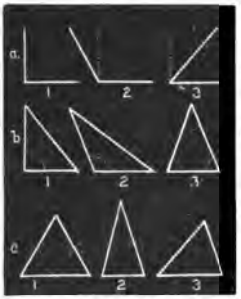
### DIVISION *a*.

ANGLES.

DEFINITIONS. — No. 1. A right angle. No. 2. An obtuse angle is that which is greater than a right angle. No. 3. An acute angle is that which is less than a right angle. The dotted line shows a right angle in 2 and 3.

### DIVISION *b*.

TRIANGLES NAMED FROM THEIR ANGLES.




DEFINITIONS. — No. 1. A right-angled triangle is that which has one of its angles a right angle. No. 2. An obtuse-angled triangle is that which has one of its angles an obtuse angle. No. 3. An acute-angled triangle is that which has all three of its angles acute angles. In 1 and 2 the angles should first be drawn, and the triangles marked on them. The angles giving names to the triangles should be marked as shown.

### DIVISION *c*.

TRIANGLES NAMED FROM THEIR SIDES.

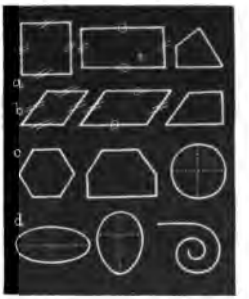
DEFINITIONS. — No. 1. An equilateral triangle is that which has its three sides equal. No. 2. An isosceles triangle is that which has two of its sides equal. No. 3. A scalene triangle is that which has its three sides unequal. The equal sides in 1 and 2 are crossed.

When these exercises have been drawn, the pupil should be required to test their accuracy by measurement.

## C. — Quadrilaterals, Polygons, Circle, Ellipse, Oval, Spiral.

DIVISION *a* and *b*. — QUADRILATERALS.

DEFINITIONS. — Four being composed of parallel lines are called parallelograms, viz.: a square, which has four equal sides, and all its angles right angles. A rectangle, which has its opposite sides equal and parallel, and all its angles right angles. A rhombus, which has four equal sides, but its angles are not right angles. A rhomboid, which has its opposite sides equal and parallel, but its angles are not right angles. Two quadrilaterals, which are not parallelograms, are the trapezium, which has no two of its sides parallel, and the trapezoid, which has two only of its sides parallel.




DIVISION *c*. — POLYGONS, REGULAR AND IRREGULAR.

DEFINITIONS. — A regular polygon is a figure having more than four sides, all its sides being equal and its angles equal. The names of the common polygons describe the number of their angles and sides, thus: the pentagon has five sides; the hexagon has six sides; etc. An irregular polygon has unequal sides and angles. The circle is a figure bounded by one curved line, called its circumference, every part of which is equally distant from a point within it, called its centre.

DIVISION *d*. — ELLIPSE, OVAL, SPIRAL.

DEFINITIONS. — The ellipse is a regular figure, having unequal diameters, struck from two centres, called the foci. The oval is a figure upon two diameters, which do not intersect at their centres. The spiral is a curved line, making revolutions round a fixed point, increasing its distance from that point at each revolution.

## B. — Two and Three Lines: Angles and Triangles.

### DIVISION *a*.

ANGLES.

DEFINITIONS. — No. 1. A right angle. No. 2. An obtuse angle is that which is greater than a right angle. No. 3. An acute angle is that which is less than a right angle. The dotted line shows a right angle in 2 and 3.

### DIVISION *b*.

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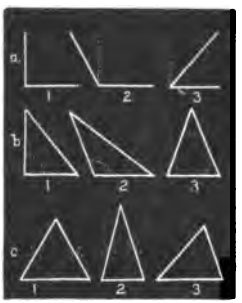


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When these exercises have been drawn, the pupil should be required to test their accuracy by measurement.

## E. — Simple and Compound Curves.

ILLUSTRATED BY DIAGRAMS AND TWO VASES.

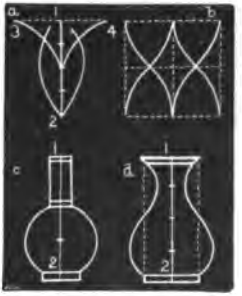


*Fig. a.* — A vertical line, 1–2, divided into four equal parts, the horizontal line 3–4 to be three quarters as long as the vertical.

Next, simple curves from the ends of the horizontal line to the centre of the vertical, and finish by drawing the simple curves from 1 to 2 on each side of the vertical line.

*Fig. b.* — A square subdivided into four squares, and compound curves regularly balanced each side the middle vertical line, crossing the common sides of the smaller squares at their centres.

*Fig. c.* — WATER BOTTLE. A vertical line, 1–2, divided into three equal parts, the lowest point on the line to be the centre of the circular part of the bottle. Draw next the two horizontal lines of the base, making them equal to one third of the vertical, and follow by drawing the top horizontal, which must be equal to one sixth of the vertical line.

*Fig. d.* — VASE. A vertical line, 1–2, divided into four equal parts, the top and bottom horizontal lines to be equal to two parts of the vertical.

Next draw the dotted vertical lines, dividing them into two equal parts. Complete the drawing by making the compound curves forming the profile of the vase.

The water bottle (*c*) is an example of a simple curve in its principal part, and the vase (*d*) of a compound curve.

## B. — Two and Three Lines: Angles and Triangles.

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ANGLES.

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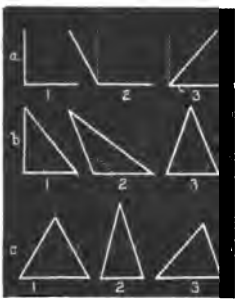


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When these exercises have been drawn, the pupil should be required to test their accuracy by measurement.

## C. — Quadrilaterals, Polygons, Circle, Ellipse, Oval, Spiral.

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## H. — Horizontal Repetition.

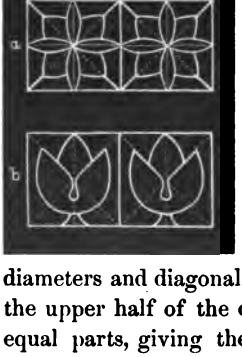



*Fig. a.* — Draw the straight lines first, forming the squares. Draw the diameters of the squares, and upon them draw compound curves passing through the centre of the squares. The leaflets which point to the angles of the squares terminate at a distance from the angles of one third of the semi-diagonal.

*Fig. b.* — Proceed as in figure *a* to form the squares. Draw the diameters and diagonals, and then the curves as indicated, the upper half of the diagonals being divided into three equal parts, giving the points for the curves to start from; the lower half of the diameters being also divided into three parts, which will get the points through which to draw the curves. These two examples may be varied by making a moulding composed of alternate squares of *a* and *b*, and the moulding should consist of not less than six squares, three of each pattern. Another variety may be obtained by making figure *b* into a vertical moulding, by repeating one square above another, with the pattern inside the squares.

Another example may be made by putting four squares on the four faces of a central square, with a rosette as in (*a*) in the central square, and a bud as in (*b*) in each of the surrounding squares, altering the stems so as to make them grow out of the central rosette, and letting them point upwards, downwards, and to right and left, away from the central square.

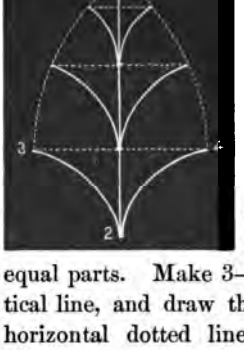
## I. — Vertical Repetition.

*Fig. a.* — Draw three squares on a vertical central line, and the diagonals of each square to find the centre, at which draw a circle, having a diameter of one third the diameter of the square. About these three circles draw the curved lines, which overlap each other alternately, the dotted lines showing what part of the forms go behind. The straight lines which are visible in the running pattern are drawn, as will be seen, upon the diagonals of the squares.

*Fig. b.* — Draw three squares as in figure *a* upon the central vertical line; then the long curves, forming the outline of the repeated leaf. Divide the central line into six equal parts, which will give the points on it from which to draw the smaller curves at the base of the leaves; then draw the circles to fill up the spaces left, and the stem upon which leaves and berries are supposed to be growing.

Exercises on these will be to make a horizontal example of *a*, and instead of placing it within three squares, to make it occupy five, terminating the curves as in *a*. A variety on *b* will be to make a horizontal moulding of it, of six squares, a leaf being repeated in each square. A horizontal line above and below, and parallel with the outer sides of the squares, will finish the appearance of the horizontal moulding.

## K. — Simple Curves, balanced.




A simple curve is a portion of a circle, or a curve struck from one centre. Thus each of the curves on the two sides of 1–2 are simple curves, and those running from 3 to 2, and from 4 to 2, in exercise L, are compound curves; that is, they are struck or drawn from two or more centres. In this example (K), first draw the vertical line, 1–2, and divide it into three equal parts. Make 3–4 equal to two thirds of the vertical line, and draw the long dotted curved lines, the horizontal dotted lines, and the symmetrical curves. When the exercise is finished, the dotted lines must all be erased, being used merely for obtaining symmetry and balance of form.

All lines used to get the position of curves, their commencement or termination, are called *constructional* lines, and it is the judicious use of these which enable the teacher or pupil to make an accurate drawing. Constructional lines are usually straight, though in this example the lines 1–2 and 1–3 are curved.

The lines of this exercise may be made the constructional lines of a leaf, the stalk being at 2, and the point of the leaf at 1.

## L. — Simple and Compound Curves.

In this example the larger curves, 3–2, and 4–2, the spiral curves near to 2, and those forming a tulip shape which end nearest to 1, are all compound curves, the other two pairs are simple curves.

Draw 1–2, and divide it into four equal parts.

Make 3–4, and 5–6, equal to three fourths of 1–2; draw the longest curves, 3–2, and 4–2, first, balancing them equally each side of the vertical line. Make 5–2, and 6–2, to join the curves just drawn, without making an angle with them. Divide 1–3, 1–4, into four equal parts each, and the central curves will end in the centres of the lines 1–3, 1–4, the tulip-shaped curves ending in the first of the four divisions on 1–3 and 1–4, nearest to 1. The spiral curves immediately above 2 end in the horizontal line which is drawn one third below the first division of the vertical line above 2.

A variety of this exercise may be obtained by drawing the spirals from the central division on the vertical line, and the tulip-shaped curves starting from the bottom of the vertical line.

### M. — Abstract Curves, illustrating the Spiral.

Draw the central line 1–2 and the dotted horizontal lines, making 3–4 equal to one half of the vertical line, and 5–6 the same length. Divide 3–4 into four equal parts, and 5–6 into six equal parts. Next draw the long curves, starting them from 5 and 6, and finish the figure by adding the smaller curves.

The spiral is a most difficult curve to draw well; it should therefore be practised much, being of the first consequence in refined drawing. It would be well to give this example without any of the smaller curves, as a preliminary lesson, and then finish by giving it as in the diagram. One side should be drawn first, and that side the left side, and then the right side be added. The object in drawing the left side first is, that the eye may see it whilst drawing the balancing curve; for if the right side be drawn first, the hand covers it whilst drawing the left, and the eye is thus without a guide.

In drawing the spiral it will be found to be of great assistance to look at it frequently upside down, for the eye rapidly gets accustomed to, and even at last cannot see, an error in a curve of this character.

If the example be drawn in a reversed position, it is an improving exercise. Or it may be repeated twice on a horizontal line passing through 2, above and below it.

## N. — Vertical Repetition.

*Fig. a.* — Draw the vertical line 1–2. Upon it construct three squares. Draw the diameters of the squares. Divide them and the horizontal sides of the squares into four equal parts. Complete the figure by drawing the oblique lines. When the whole pattern has been drawn, the effect of the interlacing of the bands is to be obtained by making each go under and over the other alternately.

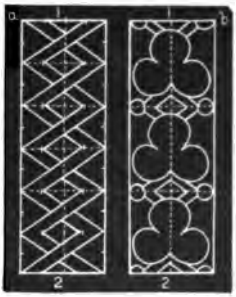



*Fig. b.* — Draw the vertical line 1–2, and construct three squares upon it, in each of which draw the trefoil leaf, not allowing its lobes to touch either side of the squares. The small circles each take up one sixth of the horizontal sides of the squares, and the small diamond shapes two sixths of the same lines.

If the squares be placed horizontally, and the pattern made by the trefoil leaf drawn as in the diagram, a moulding will be produced of another character. In this case, the berries or circular balls should be made to spring out from behind the central lobe of the leaf, and fill up the top angles of the squares on each side.

Another variety may be obtained by drawing *a* horizontally, and above it the diagram *b*, also horizontally, only letting the square in which the trefoil is placed be twice the size of the square of *a*, lineal measurement.

## 0. — Horizontal Repetition.

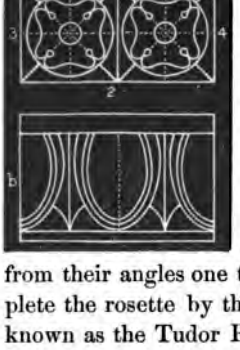


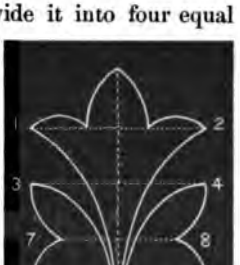

*Fig. a.* — Draw the vertical line 1–2, and the horizontal 3–4 twice the length of 1–2. Upon these two lines construct two squares. Draw their vertical diameters and their diagonals. At the centre of the squares draw circles having diameters equal to one fourth of the diameters of the square. Also circles passing through the diagonals of the squares at a distance from their angles one third of the semi-diagonals. Complete the rosette by the smaller curves, forming what is known as the Tudor Rose, though it is also drawn with five petals.

*Fig. b.* — ECHINUS MOULDING. Draw two squares, and divide them by vertical diameters into two equal parts. On the side common to both draw an ovoid form, and on the two outer sides a semi-ovoid. Complete the figure by drawing the lines as shown in diagram. Add the two horizontal lines above and below parallel with the sides of the square. This moulding is also known commonly as the egg and tongue, or egg and dart moulding. It is Greek when its forms are ovoid or elliptical; Roman when the principal shape is more circular. In both cases it was a sculptured enrichment. The example given is Greek in character.

The teacher may awaken some degree of interest in the lesson by asking the pupils to try and find this moulding on some public building, if a classic building exists in the neighborhood.

### P. — Moresque Ornament.

Draw the vertical line, and divide it into four equal parts. Make 1–2, 3–4, 5–6, equal to three fourths of the vertical line. Next draw the long curves from the ends of 1–2 to the bottom of the vertical line, then the curves from 3–4 and 5–6 to the same place.




Divide 1–2 into three equal parts, giving the proportions of the trefoil, and make 7–8 equal to one half of the vertical line. Finish the figure by drawing the short simple curves, 3–7, 7–5, 4–8, 8–6. This example may be varied by repeating it again below the line 5–6, drawing it bottom upwards; it then becomes a diaper pattern, and may be inclosed in a rectangle. Or a square may be constructed on 5–6, as one side, and then the pattern given above may be repeated four times, *i. e.*, once as above, and again on each of the three other sides of the square. The square itself may be filled up by drawing in it a rosette, such as *a* in diagram H, or *c* in diagram G. The first step in design is to take a form already drawn, and so use it as to produce a new combination, which will be found interesting to pupils of all ages, as an exercise partly in drawing and partly in inventing.

## Q.—Flower, Leaf, and Berry.

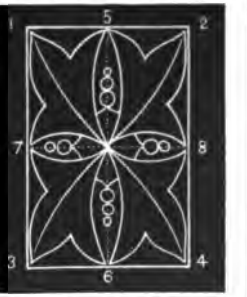
Draw the vertical line and divide it into three equal parts. Make 1–2, 3–4, each equal to two thirds of the vertical line.

Next draw the long curves from the ends of 3–4, giving the centres of the leaves and stems, the leaves being trefoils. The flower constructed by compound curves from points 1 and 2, ending in the centre of the first division of the vertical line, and returning to a point one third up from the line 3–4 of the top division of the central line. The stem of the flower is to be drawn from the point where its outline touches 3–4. The line 5–6 is slightly shorter than 3–4, and the lines 3–5, 4–6, should be drawn. The details of the flower, leaves, and pendant berries to be added by the measurement of the eye. The stems of the leaves to be made to follow the curves drawn from 3 and 4 to the bottom of the sprig.

A simpler form of this exercise is to make the leaves in one lobe only, not trefoils or three-lobed as above; and to let the profile of the flower drawn from 1 and 2 be straight lines instead of compound curves, the middle leaf of the flower being also straight until it meets the outer leaves.

The proportions given for the construction of this sprig may be used for almost any flower and leaves, such as the convolvulus, the hawthorn, the maple, etc., etc.

## R. — Oblong Rosette.




Draw the oblong, 1, 2–3, 4, making the short side two thirds of the long side. This can best be done by drawing a vertical line, 5–6, and dividing it into three equal parts, then drawing the horizontals, 1–2, 3–4, equal to one division of 5–6 on each side of it; afterwards drawing 1–3, 2–4, to form the circumscribing oblong. Draw the compound curves through its centre from the angles 1 and 2, to 4 and 3 respectively, and also from the extremities of its diameters, 5–6, 7–8. Complete the leaves, and add the berries, as shown, the figure upon which the berries are placed being made upon half the shorter diameter of the oblong. Two berries are to be drawn upon its horizontal, and three on its vertical diameters. This exercise can be varied by putting the ornament inside a square, instead of an oblong, only that in such case the berries will be either two *or* three on each semi-diameter — not two *and* three, and the lobes of the leaves will be symmetrical. It will be seen that in a large proportion of the examples given, the ornament is placed within a geometrical form. The object of this is, first, to give practice in the drawing of straight lines, which is always useful; and, secondly, to make this practice lead up to something more interesting than straight lines.

### 8. — Greek Anthemion.

Draw the vertical line, and divide it into two equal parts. Make 1–2 equal to two thirds of the vertical line, and 3–4 equal to one third, at a distance of one third the vertical line from its lower extremity.

Draw the dotted curved lines inclosing the leaflets or sepals of the anthemion, and terminating in the upper and lower extremities of the central line. The points on this curved outer line, where the members of the anthemion touch it, should then be marked on either side, and the forms be drawn; afterwards the spiral lines, which are at its base, should be sketched by judgment of the eye. This ornament is a conventionalization of the honeysuckle, or columbine, or woodbine, and is among the most refined of the beautiful forms we derive from Greek art.

A horizontal moulding may be made of this example by continuing the two lines forming the spiral upwards to inclose the whole figure, parallel with the dotted lines, which pass through 1–2, and meeting above in the central vertical line. The oblong in which the figure is inclosed may then be repeated horizontally as many times as desired, and the same figure drawn in each.

## T. — Oblong Rosette.

Draw the line 1–2, and divide it into three equal parts. At 1 and 2 put two thirds of the central line horizontally, then complete the oblong or rectangle; draw its diagonals and short diameter. Parallel with the diagonals draw lines which will form the outlines of four lotus or lily-shaped flowers, adapting them to the space to be filled.

EXERCISE 2. — Another exercise will be to place this ornament within a square, keeping the general shape of the lilies the same as in the upper and lower quarters of the oblong. The lotus flower is an Egyptian ornament, symbolic of the Nile, — source of fruitfulness and plenty.

EXERCISE 3. — Draw a line 1–2, and 3–4 across its centre and equal to it. Let these be the diagonals of a square; draw the sides and the diameters; then place a lotus in the upper small square, and repeat in each of the others. The variation will be that in the two former exercises the lotus is drawn on the semi-diameters, but in this it will be placed on the semi-diagonals.

## U. — Sprig of Convolvulus.

Draw the vertical line and divide it into two equal parts. Make 1–2 equal to three fourths of the vertical line; 3–4 equal to three fourths of 1–2.

Draw the long curves from the ends of 3–4 to the centre of 1–2. Upon the lower third of the upper half of the vertical line draw the calyx of the convolvulus flower, and upon the upper third draw the open corolla. From the centre of 1–2 draw five leaves, springing from it also two unopened buds.

If this exercise be found difficult, it may be simplified by omitting the four side leaves, drawing only the uppermost flower, the lower leaf, and the two buds. The second exercise may then add the four side leaves, as a new design springing from the first.

The convolvulus flower as drawn above will repeat four times in a square, and make an attractive example. Thus: Draw a vertical line, 1–2, and a horizontal one, 3–4, through its centre, and of the same length. Let these be the diameters of a square, which construct. Draw its diagonals. In the upper quarter of this square draw the convolvulus as above, and repeat in the three other quarters. The calyx should equal about one fourth of the semi-diameter.

## V. — Acorn and Cups.

Draw the central vertical line, and divide it into three equal parts. On the first division from the top draw a horizontal line, 1–2, slightly longer than one third of the vertical line. Above this draw the outline of the acorn; below it draw its cup, descending nearly, but not quite, to the second division from the top of the central line. The outer lines of the empty side cups are semicircles, and they are to be drawn and finished the same as the full cup.

It is to be remembered that these natural forms are conventionalized, both by their symmetry and by the lines on the cups, which only suggest, and do not assume to represent, the corrugations of the cups.

EXERCISE 2. — Draw the same figure as the above, and draw the side cups with acorns in them the same as the top.

EXERCISE 3. — Draw exercise two, and then continue the central vertical line to twice its present length. From the bottom of this produced line make two oak leaves spring symmetrically upwards, on the sides of the acorn.

## FREE-HAND DRAWING. PART II.

### A. — Ivy Leaf.

Draw the vertical line, 1–2, and divide it into six equal

parts; 3–4 to be equal to two parts of the vertical line, and 5–6 to five parts. Draw the profile, and complete the leaf. To vary this exercise, draw a leaf such as is illustrated, on each of the four angles of a square whose side equals half of 1–2.

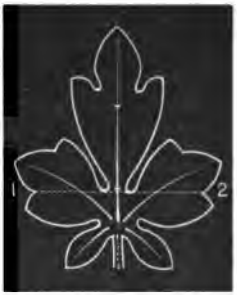
There are various forms of ivy leaf, as, the house ivy, the Irish ivy, the hedge ivy, etc.; that which grows wild in the hedges being by far the most beautiful. Its chief peculiarity lies in the fact that the upper lobe is longer than the lower part of the leaf, about four sevenths of the central line. The two lower lobes are divided much more than the above, and are more equal in size; the remaining proportions are about the same as in the illustration given.

Exercise 2. — Within an equilateral triangle place three ivy leaves, each pointing to an angle of the triangle, and the stems of all joining at the centre, a circle touching the bases of the leaves, and thus joining their stems. The ivy berry, a small sphere, in clusters, may be also made to grow from the circle, between the leaves.

Exercise 3. — Construct a square, and put four similar ivy leaves within it, upon the same principle as in the triangle.

## B. — Maple Leaf.

Divide the vertical line into three equal parts. Make 1–2 equal to two thirds of the vertical line. Draw the veins of the side lobes through the division of 1–2 into thirds. Complete the leaf as shown.




In drawing a leaf, it is always advisable to get first its central vein or midrib, and then the most important fibres springing from it. The profile of the leaf is then drawn round these skeleton lines.

In drawing the maple leaf above, it should be noticed that the curves which form the divisions of the leaf are always convex from the centre of each leaflet; there is nothing like concavity or hollowness of curve. Also that the lines forming the divisions between the leaflets have a rounded shape, — they do not make angles with each other.

EXERCISE 2. — Draw a vertical line, and divide it into three equal parts. Upon the central part, as a vertical diagonal, construct a square. Continue its horizontal diagonal to equal the vertical line, half on either side. Upon each of the ends of the vertical and horizontal lines, beyond the angles of the square, draw a maple leaf as shown above, and with the same proportions. Within the square draw a trefoil of arcs of circles, and within it draw a maple flower as shown in Exercise E.

### 6. — Ivy Ornament.

Divide the vertical line into four equal parts, and make 1–2 equal to three parts of the vertical line.

Draw the dotted inclined lines, and commence by drawing the upper ivy leaf on the central line, and then the lower leaf, whose centre is on the first division from the bottom of the vertical line. The midribs of the side leaves are to be then drawn, which in this case will be the backs of the half leaves, the three visible lobes being divided similarly in the side view to what they are in the front view.

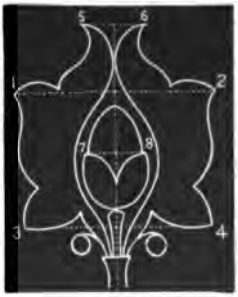
The berries are to be added when the leaves are completed.

Exercise 2. — Instead of drawing the two side half leaves which point downwards, omit them, and put the three berries on each side in their places growing out of the stem as the leaves do. Omit them from below when they occupy the places of the side half leaves.

Exercise 3. — Draw a vertical line, and divide it into three equal parts. Through the first division from the top draw a horizontal line equal to two thirds of the vertical. Upon the upper third of the central line draw an ivy leaf similar to the top leaf of the above. From the extremities of the horizontal line draw lines curving slightly inwards to the bottom of the vertical, and upon them, towards the vertical, draw two half leaves. The stems of the three join at the bottom.

### D. — Alhambra Ornament.

Divide the vertical line into four equal parts. Make 1–2 and 3–4 equal to three fourths of the vertical lines. Next draw the longest curved lines nearest the vertical line, starting from the extremities of 5–6, which is equal to one fourth of the vertical line, and ending in its lowest extremity. The profile should then be drawn on the left side, ending with the stem of the leaf, which is drawn to the lower extremity of the vertical line; the balancing curves on the right leaf to be then drawn. The flower in the centre is constructed on the line 7–8, equal to one fourth of the vertical, the upper and lower portions occupying nearly all of the two middle divisions, and being equal in length. The flower, stem, berries, and husk to be added by the measurement of the eye, and the lower ends of the leaves which come within the husk to be erased.




EXERCISE 2. — On the line 3–4 construct a square, and repeat the pattern on each side of the square, as upon 3–4, making the berries and husks larger so as to fill the square itself.

EXERCISE 3. — Repeat the above sprig of foliage and fruit from a centre, radiating on three lines or four, so as to make a compound rosette; or repeat it horizontally as a moulding, enclosed within an oblong or rectangle.

### E. — Maple Ornament.

Divide the vertical line into two equal parts. Make

1–2 equal to three fourths of the vertical line. Draw the longest curved lines, next from 1–2 to 4, crossing 3–4 at its centre. In this case, the right hand leaf being in front, and therefore wholly visible, should be drawn first, and when complete, the visible part of the left hand leaf be added to it, balancing that first drawn. The stems of the leaves are to be varied by a foil or point about half way from the bases of the leaves to 4.

The conventionalized flower below 3 is then to be drawn, starting with the circle at its centre, and the three straight lines passing to each sepal of the flower; the three-lobed flower to be added so as to fill the space between the leaves. The side flowers towards the bottom to proceed from a stem beginning in the central line and passing through an aperture in the leaf stems opposite the foils in them.

EXERCISE 2. — From the front view of the maple leaf in diagram B., and the side view and conventionalized flower here drawn, the teacher may design other arrangements which shall be ornamental and attractive.

## F. — Leaf.

Draw the vertical line forming the midrib of the leaf, and the oblique midribs of the leaflets. Then draw the outline of each leaflet.

In a compound leaf, where the leaflets are smooth-edged, as in this leaf, it is best to draw each leaflet complete, as shown by the dotted parts which go behind, afterwards erasing those portions which are not visible. The object of this is, that the visible parts may be consistent with each other, which is not often the case unless the whole form be drawn. It will be found also to be the most expeditious method, requiring the fewest corrections.

EXERCISE 2. — Using the same proportions and veins, the pattern may be varied by making each leaflet with three lobes or points, as in a trefoil leaf; and if desirable, the top lobe may be omitted and a flower put in its place, — the potato flower suiting the leaf best.

EXERCISE 3. — Upon a cross composed of two lines crossing each other at their common centres, put four of these leaves, and between each pair draw a flower which is a cinque-foil, or a bunch of spheres which shall represent the ball or seed of the flower.

### 6. — Clover Leaf.

Draw the vertical line, and divide it into two equal parts. Upon the upper half construct the top lobe. Draw the midrib of the lower lobes from a point immediately below the base of the upper lobe on the central line, and complete the side lobes.

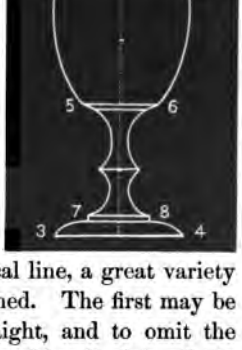
EXERCISE 2. — Draw an equilateral triangle, and place a leaf such as the above within it, on lines which are drawn from the centre of the triangle to its three angles.

EXERCISE 3. — Draw a vertical line, and divide it into three equal parts; through its centre a horizontal line, equal in length to the vertical, and similarly divided. Draw a circle through the divisions on both lines nearest their common centre. Upon the remaining portions of the vertical and horizontal lines draw single lobes of the clover leaf, so as to obtain the effect of the four-leaved shamrock.

EXERCISE 4. — Draw a vertical line, and divide it into four equal parts. Upon it put one complete clover leaf pointing upwards as above and occupying the upper half, and a second pointing downwards on the lower half. Draw a horizontal line passing through the centre of the vertical line, and place one lobe of a leaf on each side upon it. If the horizontal and vertical lines be equal, a quatrefoil will be thus produced.

## H.—Wine Glass.

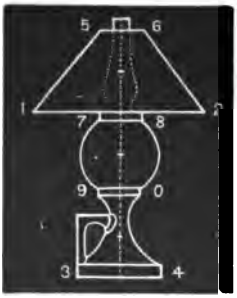
Divide the vertical line into four equal parts. Make 1–2, 3–4, equal to two fourths of the vertical line; 5–6 equal to one fourth; 7–8 to be a little shorter than 5–6. Finish the figure by making first the long curved lines forming the sides of the bowl, then the lines of the stem, and finally those of the base.




EXERCISE 2. — Upon the same proportional division of the vertical line, a great variety of shapes in glasses may be obtained. The first may be to make the lines 1–5, 2–6, straight, and to omit the point in the centre of the stem, making it plain all the way down.

EXERCISE 3. — A second variety can be produced by drawing the straight lines from 1–5 and 2–6, *as constructional lines*, dividing them into two equal parts, and through those divisions making compound curves, which will thus form the profile. In the centre of the stem draw a circle having a diameter of one eighth of the vertical line. The base of the glass may be the same in all three cases. The top of the glass may be ornamented by parallel horizontal double lines, near the lip, and between them drawing a star repeated round the glass. The star may be composed of four straight lines crossing each other at a common centre, like the exercise *a* in diagram D.

## I. — Lamp.




Divide the vertical line into six equal parts (the upper portion of the chimney is to be added to the line in finishing), and make 1–2 equal to four parts, 3–4 equal to two parts, 5–6, 7–8, 9–0 equal to one part. Draw the oblique lines 5–1, 6–2, forming the shade, and the short vertical lines above 7–8, upon which place the chimney of the lamp. The glass bulb containing the oil is a circle struck from the centre of the vertical line ending in 7–8, 9–0. Draw a line parallel and equal to 3–4, one third of one division on the vertical line above it, and join the extremities of the two by vertical lines. Draw another line immediately below 9–0, parallel with and equal to it, a sixth of one vertical division from it, and join the two horizontals by short vertical lines. The profiles of the base between 9–3 and 0–4 should then be drawn and the handle added, the line above 3 being vertical.

### K. — Diamond Rosette.

Draw the vertical and horizontal diagonals, the latter being rather more than three fourths of the former. The husk and berries to be first drawn, then the stems of the four leaflets, the edges of the leaves to be added, and lastly the right-angled triangles forming the margins.

In drawing the husk and berries it will be well to let both be included in one curve so as to insure the right direction for the berries which issue from the husk. The two side leaves balance each other, and the lower leaf is symmetrical; the upper leaf being the same as to its outline, but the midrib alters its shape slightly at the lower part.

EXERCISE 2. — Draw the diamond form, and make each of the four leaves symmetrical, and like each other. At the centre draw a flower composed of a quatrefoil of arcs of circles, each being more than a semicircle, and omit the husk and berries as shown above.

EXERCISE 3. — In the diagram the top and bottom leaves have each five points, the side leaves three. For a third exercise, make a square upon vertical and horizontal diagonals, and in each angle put a leaf with five points, like the upper and lower leaves in the diagram. The centre of the rosette may be composed of five berries, — one in the centre, and the rest around it on each semi-diagonal.

### L. — Square Rosette.

Draw the square, its diagonals and diameters, and the circle at its centre on a diameter equal to one fourth of the diameter of the square. Next draw the compound curves on the diagonals passing through the centre of the square. Complete the rosette by drawing the leaves on each semi-diameter. The moulding at the base of the square is one third the depth of the square itself.

EXERCISE 2. — Treat this as one unit in a moulding, and place two others by its side, so as to make three squares similarly filled. The horizontal moulding at the lower part will be continued, and the semicircles completed, to form repeating circles below the junction of the squares.

EXERCISE 3. — Draw the square as in Exercise 1, its diameters and diagonals, and the circle at its centre. But instead of drawing the compound curves on the diagonals, draw them on the diameters, and add the ornament as above in each angle, instead of towards each side of the square.

### M. — Diamond Rosette.

Draw the two diagonals, and the parallel lines forming the moulding of the diamond. Draw the diameters of the diamond, and in each angle draw the lotus flower, — an elliptical berry at the centre forming their base. Upon the diagonals of the diamond construct a rectangle, and add the ornaments between the moulding of the diamond and the angles of the oblong.

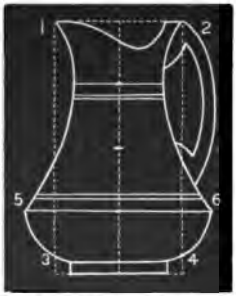
The spiral lines in the upper angles of the rectangular form may be drawn as a preparatory exercise to this example, which is rather difficult for one lesson. In the same way the irregular trefoil flower in the lower angles may be so treated, a right-angled triangle being drawn first, and the circular centre next. Any one of the lotus flowers will make a very easy exercise, and the four flowers without any outside ornament will also make a design for one lesson. These drawn separately may then be combined into one lesson, as illustrated above.

EXERCISE 2. — Make a square rosette of this by constructing the two diagonals equally. Treated as a square, the ornament in each angle should be the same, and the triangular flower at the lower angles would be those most suitable for a square rosette.

EXERCISE 3. — Instead of putting the lotus flowers in the centre of the diamond, design a flower of the same character as the triangular flowers, but with four points, each point in one of the angles of the diamond form.

## N. — Pitcher.

Divide the central vertical line into four equal parts.



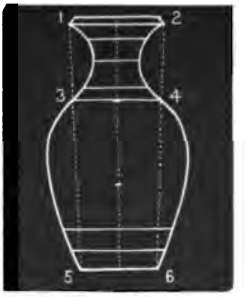

Make 1–2, 3–4 equal to two parts of the vertical line, 5–6 equal to three parts. Draw the dotted lines 1–3, 2–4, and complete the contour of the pitcher.

It will be seen that the curve from 1 to 5 crosses the line 1–3, a little below the central point on the central line, and that the inner line forming the handle ends opposite to that point. The base of the pitcher is equal in width to one and a half parts of the vertical line. The spout and handle are to be drawn by judgment of the eye; the parallel lines also.

EXERCISE 2. — Upon the same constructional lines, 1–3, 2–4, which form two squares one above the other, a second pitcher may be drawn differing in contour and general character from this. Instead of drawing a curve from 1 to 5 and from 5 to 3, let the curve be unbroken at 5 and round off to 3, and the same on the opposite side. Carry the horizontal line 1–2 out beyond 2, equal to half of 1–2, in a straight line, and from its extremity draw another straight line to a point just above 6. This forms the outer line of the handle, to which add the thickness, and then put a spout curving above 1–2, and passing through its centre below it, and returning to the point from whence the handle starts.

## 0.—Vase.

**Divide the central vertical line into three equal parts. Make 1–2, 3–4 equal to one part of the vertical line, and 5–6 rather less than one third. Draw the dotted lines, 1–5, 2–6, and complete the vase by drawing the compound curves forming its outline from 1 through 3, and terminating in 5; and its fellow from 2 through 4 to 6. The lip of the vase is drawn parallel with and above 1–2, the parallel lines on the surface of the vase to be drawn in the positions shown.**




In deciding the exact position of any feature for which measurements are not given, their proportion to other lines already drawn must be judged. Thus the two parallel lines above 5–6 are the same distance apart, and the upper one at the centre of the first division of the vertical line. That determines both its own position and also that of the line below it.

In the same way the shortest horizontal line in the neck of the vase is at the centre of the top division of the vertical line; this line being drawn, the eye must judge the distance of the lines above and below it. It is not advisable to give exactly proportioned measurements for every detail, but to leave something for the eye to judge.

Horizontal lines may be placed in any part of a vase which does not divide it equally into two parts, and variety may be obtained by placing them very near together in parts, leaving them wide apart in other places.

P. — Candlestick and Candle

Divide the vertical line into four equal parts. Make 1–2 a very little longer than three fourths of the vertical line, 3–4 equal to one half of 1–2. Draw horizontal lines below 1–2, and above 3–4, and equal to them both respectively, and the compound curves which join the extremities of the two horizontal lines last drawn will give the body of the candlestick; the socket of the stick, at its top, is in the centre of the vertical line, and the top fourth of the same line being divided into two equal parts will give the top of the candle and length of the wick.

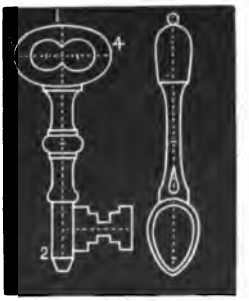
The handle should have its outer line drawn first, and the inner line, giving its thickness, added. The extinguisher, drawn last, must be made to fit into its place, the size shown, the two inclined lines of its sides inclining equally downwards to right and left.

In this example few exact measurements are given; it will therefore be suitable to give as an exercise for the best pupils to put on the blackboard, without giving them more than general instruction concerning its proportions.

EXERCISE 2. — Vary the proportions of this example by making 1–2 equal the whole length of the vertical line, and 3–4 equal to half the vertical line. Keep all the other proportions the same, and all the details, handle, extinguisher, candle, and stick, the same size as above.

## Q.—Key and Spoon.

### THE KEY.




Draw the vertical line, 1–2, and divide it into four equal parts. Draw the horizontal line, 3–4, through the centre of the upper part, and equal to two fifths of the vertical. Upon this draw an ellipse; divide 3–4 into three equal parts; the two middle divisions will give the centres of the circular arcs. Draw two vertical lines parallel with 1–2, and in the divisions of 1–2 draw the details of the handle as shown. The wards of the key drawn on the lower fourth are to be made symmetrically, on a horizontal line from the middle of the lower division of 1–2, and equal to it in length.

### THE SPOON.

Divide the vertical line into four equal parts, and using the dividing points in the line, construct the figure. Observe that the bowl of the spoon occupies rather more than the lower fourth.

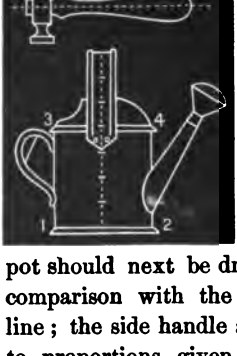
A variety of the key may be made by dividing the central line into five equal parts, instead of four, and placing two projections on the stem instead of the one at its centre, as in the given diagram. The shape of the handle and divisions of the wards may also be varied, and it would be well to take the key of the class-room door and put it to proportions as shown in the diagram.

The teacher might, after the class had drawn the spoon, draw the side view of a spoon, as it would be seen resting on a table upon its bowl and handle.

## R. — Water-Pot and Hammer.

### THE WATER-POT.

Divide the central vertical line into seven equal parts.



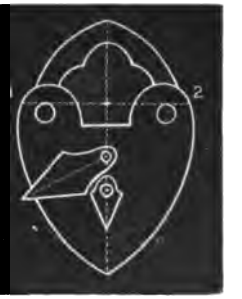

Make 1–2 equal to four parts of the vertical line. Draw 3–4 through the third division from the top, and make it equal to one half of the vertical line. Draw vertical lines 3–1 and 4–2 to make the sides of the pot, and a line directly above 1–2 parallel with it, the same length as 3–4. The top handle and cover of the pot should next be drawn, judging their dimensions by comparison with the divisions of the central vertical line; the side handle and spout to be placed according to proportions given, by seeing how far they project either horizontally or vertically beyond the parts already delineated.

### THE HAMMER.

The horizontal line forms the central line of the handle, and is to be drawn indefinitely, as shown. The head of the hammer will consist of vertical lines, horizontal lines, and curves, which being drawn, the handle may be added, noticing that it is symmetrical, treating the horizontal line as the central line.

The teacher is recommended to measure a hammer, and thus obtaining its approximate proportions, make a diagram from it on the blackboard, occasionally referring to the object, and noticing each part of it as drawn. One which is different in shape to the above diagram, and having no complex proportions, will be the best for this purpose.

## U. — Padlock.




Draw the central vertical line, and divide it into three equal parts. Make 1–2 equal to two thirds of the vertical line. Divide it into three equal parts, and then draw the heart-shaped portion of the figure, making the sides first. The top part of the lock is drawn by continuing the side curves through the divisions of 1–2, terminated by the short horizontal line just below 1–2. The hasp part above 1–2 is pointed to correspond with the lower part, and the thickness of this is indicated by the trefoil curves.

The key-hole is placed on the first division of the central line from the bottom, and the lappet which covers the hole drawn on one side to show the key-hole complete.

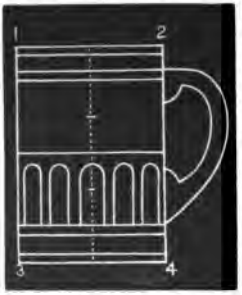
EXERCISE 2. — Instead of making points at the upper and lower extremities of the lock, draw rounded curves, and let the points of the key-hole and lower part of the lappet be rounded also.

Omit the trefoil showing the thickness of the hasp, and draw instead a simple curve, following and parallel with the upper curve. All the proportions of the lock may otherwise remain the same.

EXERCISE 3. — The key for such a lock would be an interesting lesson to succeed this, and if a padlock is within reach of the teacher, it would be well to display both real object and the drawing.

## T. — Mug.

Divide the central vertical line into six equal parts.




Make 1–2 and 3–4 equal to two thirds of the vertical line. Draw the sides of the mug, and place the other horizontal lines in their positions, the lower line of the top group and upper line of the bottom group being drawn through the first divisions of the central line from the top and bottom, and the single line in the centre going through the central division. In drawing the fluting towards the bottom, the centre flute is the largest, and the widths of the side flutes decrease towards the outlines of the mug. The handle at its widest point is equal to one third of the vertical line, and its greatest projection from the mug is towards the top. Notice the particular horizontal lines from which the top of the handle springs, and in which it ends. The inner line giving the thickness of the handle will be the last drawn, and the tendency of the pupils to make this handle thick and clumsy should be anticipated and checked.

Exercise 2. — The proportions of this figure may be varied by dividing the central line into four equal parts, making the width of the mug equal to half its height. The details may be kept the same, with the exception of the handle, which will be better made half square in shape, projecting as far as the above, but equally at top and bottom.

## U. — Padlock.

Draw the central vertical line, and divide it into three equal parts. Make 1–2 equal to two thirds of the vertical line. Divide it into three equal parts, and then draw the heart-shaped portion of the figure, making the sides first. The top part of the lock is drawn by continuing the side curves through the divisions of 1–2, terminated by the short horizontal line just below 1–2. The hasp part above 1–2 is pointed to correspond with the lower part, and the thickness of this is indicated by the trefoil curves.

The key-hole is placed on the first division of the central line from the bottom, and the lappet which covers the hole drawn on one side to show the key-hole complete.

EXERCISE 2. — Instead of making points at the upper and lower extremities of the lock, draw rounded curves, and let the points of the key-hole and lower part of the lappet be rounded also.

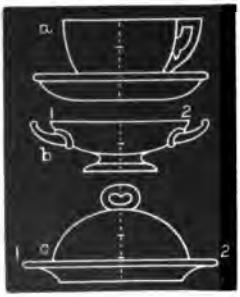
Omit the trefoil showing the thickness of the hasp, and draw instead a simple curve, following and parallel with the upper curve. All the proportions of the lock may otherwise remain the same.

EXERCISE 3. — The key for such a lock would be an interesting lesson to succeed this, and if a padlock is within reach of the teacher, it would be well to display both real object and the drawing.

## V.—(a) Cup and Saucer. (b) Salver. (c) Muffin Dish.

### THE CUP AND SAUCER.

Draw a vertical line, and divide it into three equal parts. Through the first division from the bottom draw a horizontal line equal in length to twice the vertical, and another immediately beneath it, parallel to it. Complete the saucer. For the top of the cup draw a horzontal line equal to four thirds of the vertical line. Draw the sides of the cup and the handle.




### THE SALVER.

Divide the vertical line into two equal parts. Make 1–2 three times as long as the vertical line. Draw the long curve of the bowl passing through the centre of the lower division of the vertical line. Add the handles and the base.

### THE MUFFIN DISH.

Divide the vertical line into four equal parts. Make 1–2 twice as long as the vertical line. The handle occupies the upper fourth of the vertical line, and the bowl of the cover is a semi-ellipse rather more than twice the width of its height.

The teacher may usefully vary the proportions given, and alter the curves. Thus the outline of the saucer in *a* may be a compound curve instead of simple, and the salver will be improved by making 1–2 five times as long as the vertical line, keeping other details the same.

# MODEL AND OBJECT DRAWING.

# INTRODUCTION

TO

# MODEL AND OBJECT DRAWING,

## ON THE BLACKBOARD.

BEFORE the pupil is able to draw from the actual solid, with any degree of intelligence, the simpler forms, for explaining the rudiments of perspective, should be illustrated on the blackboard by the teacher and drawn by the pupil. The unpracticed eye does not realize what it actually sees, and before it can be made to look for and understand what is seen, the general principles which control both the vision and the art of representation must be explained. It is not necessary to go into abstruse details of principles to secure this; that would be confusing to the pupil, and of no advantage to the understanding of the subject; but leading principles, the effects of which the eye may be readily taught to discover, *must* be made the basis of model drawing, by an intelligent teacher.

Such principles are, that a circle seen in perspective becomes an ellipse, that parallel lines retreating from the eye appear to converge, and diagrams which fairly

demonstrate these axioms are among the course of lessons in this book.

As soon as a principle has been enunciated, and its illustrative diagram drawn, the next step should be to put an actual solid before the eye of the pupil, and its representation be the next lesson given to him. Where these main laws affect indirectly the drawing of an object, they should be pointed out, over and over again, even at the risk of over-repetition; for the mistakes made in model drawing will really arise from forgetting the simple laws which have been most frequently repeated. Cylindrical forms, such as have been turned in a lathe, or made on a potter's wheel, are the best subjects to commence with, and are, at the same time, the most interesting to children.

In the exercises given, an effort has been made to furnish representative subjects, so that armed with the knowledge given by a careful scrutiny of the course, the teacher may take other subjects of his or her own selection, and upon the principles shown, make diagrams to vary the lessons, from the most familiar objects.

One thing must be remembered, that model and object drawing is drawing from the *solid* and not from the *flat*, so that flat drawing is only an introduction to the study, and is not really the study itself. But the introduction is so necessary to understanding the subject, that unless it precedes the study from the solid, much time will be wasted and poor results be obtained. The geometric solids from which the first lessons in model draw-

ing are usually given, should be in the hands of the teacher, and be frequently shown to the pupil, even before they are drawn, so that the diagrams on the board may be explained by them. Afterwards, the pupil may be safely intrusted with the task of representing them, backed by a knowledge of how they must of necessity appear, under given conditions.

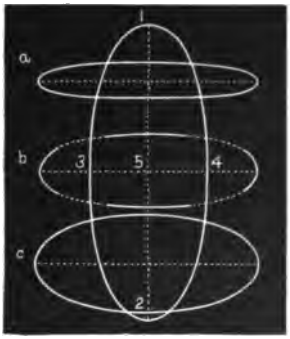
Trusting to the knowledge and imagination only, is a bad thing; trusting to the eye only, without developing the imagination and cultivating the understanding, is an equally imperfect method of teaching drawing. The wise teacher will resort to both, and make each support the other, obtaining good results from their combination.

To alternate an object lesson on the blackboard, with one from the solid during the earlier part of the course, will be productive of more progress on the subject, than to adhere exclusively to either, and this method the teacher is advised to pursue.

# MODEL AND OBJECT DRAWING.

## PART I.

### A.—The Ellipse.




A regular curve struck from two centres, having unequal diameters. The character of an ellipse is determined by the proportion of the major and minor diameters to each other. No part of an ellipse is any part of a circle, nor will any portion of it be a straight line.

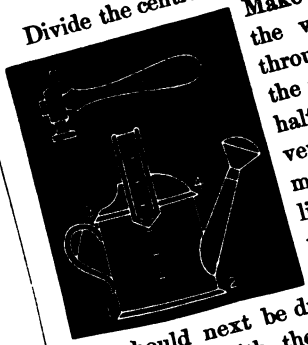
Place the two diameters of the vertical ellipse 1–2 and 3–4 at right angles at their common centres, 5. Draw the rounded ends of the ellipse near 1 and 2, first, and then the flatter parts to join them, as shown in *b*. Draw ellipses, as *a*, *b*, and *c*, with diameters varying in proportion, and with the longest (major or transverse) diameter, in a horizontal position. The short diameter is also called the conjugate diameter, and both are sometimes described as the axes of the ellipse.

This form is so important in drawing, that it should be drawn by the scholars every week, the dimensions being given, dictated in figures to the class.

## R.—Water-Pot and Hammer.

THE WATER-POT.

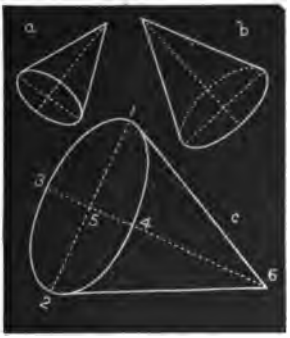
Divide the central vertical line into seven equal parts. Make 1–2 equal to four parts of the vertical line. Draw 3–4 through the third division from the top, and make it equal *to one* half of the vertical line. Draw vertical lines 3–1 and 4–2 *to* make the sides of the pot, and a line directly above 1–2 *parallel* with it, the same length as 3–4. The top handle and cover *of the* pot should next be drawn, judging their dimensions by comparison with the divisions of the central *vertical* line; the side handle and spout to be placed according to proportions given, by seeing how far they *project* either horizontally or vertically beyond the parts already delineated.



THE HAMMER.

*The* horizontal line forms the central line of *the handle, and* is to be drawn indefinitely, as shown. The head *of the* hammer will consist of [illegible] *lines,* and curves, [illegible] *added,* noticing [illegible] *zontal* line [illegible]

## C. — Cones.




The same rules which govern the drawing of the cone when its axis is vertical, apply also when it is lying on its side, or standing, as in *a* and *b*, upon a point in its base. The description of how to draw the last exercises may be therefore used for this, only that when the axis of the cone is oblique it is best to draw the axis first, then the long diameter of the base at right angles to the axis, and then proceed as before.

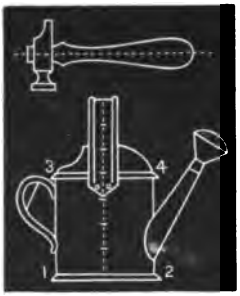
Thus, in example *c*, let the line 3–6, be drawn indefinitely from 3 to 6, the width of the visible base 3–4, to be fixed, and the bisecting line the long diameter 1–2, be next settled. The point 6 being decided, the completing tangents 6–1, 6–2, are added to complete the figure.

*A* and *b* are applications of the rule, *a* displaying the whole base, and *b* only a portion.

## R. — Water-Pot and Hammer.

### THE WATER-POT.

Divide the central vertical line into seven equal parts.



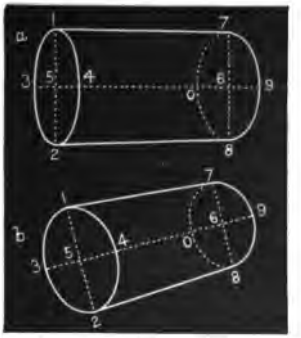

Make 1–2 equal to four parts of the vertical line. Draw 3–4 through the third division from the top, and make it equal to one half of the vertical line. Draw vertical lines 3–1 and 4–2 to make the sides of the pot, and a line directly above 1–2 parallel with it, the same length as 3–4. The top handle and cover of the pot should next be drawn, judging their dimensions by comparison with the divisions of the central vertical line; the side handle and spout to be placed according to proportions given, by seeing how far they project either horizontally or vertically beyond the parts already delineated.

### THE HAMMER.

The horizontal line forms the central line of the handle, and is to be drawn indefinitely, as shown. The head of the hammer will consist of vertical lines, horizontal lines, and curves, which being drawn, the handle may be added, noticing that it is symmetrical, treating the horizontal line as the central line.

The teacher is recommended to measure a hammer, and thus obtaining its approximate proportions, make a diagram from it on the blackboard, occasionally referring to the object, and noticing each part of it as drawn. One which is different in shape to the above diagram, and having no complex proportions, will be the best for this purpose.

## E. — Cylinders.



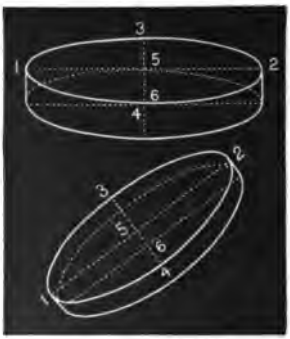

When the cylinder is upon its side as at *a*, its axis on the level of the eye, the profile 1–7, 2–8, will converge towards the axis 5–6, equally, and 7–8 will be shorter than 1–2.

When the cylinder is below the eye upon its side, as in *b*, then axis 5–6, and profiles 1–7, 2–8, will converge and point upwards to the level of the eye.

It is to be remembered that the axis of the cylinder and long diameters of its elliptic bases will always be at right angles to each other, as in the cone.

In drawing a cylinder in either of these positions, the axis is to be drawn first, indefinitely, and the line 1–2, the longest diameter of the ellipse next, at right angles to the line of axis. The length of 1–2 being decided, 3–4 must then be determined. The axis 5–6 should be next settled, and the invisible end of the cylinder drawn. The profiles 1–7, 2–8, are tangents to the two ellipses.

## F.—Disks.

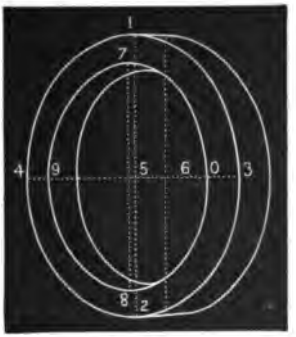



A disk is a section or thin slice of a cylinder, and will have to be drawn in a similar manner. The visible surface or end being so important in its representation, should be completely drawn before the profile of its sides or half invisible base be added.

An oblique disk, as in the second illustration, or with its axes pointing downwards to the left, instead of to the right, will enable the teacher to test the class, and see whether the *principle* of drawing the cylinder has been understood. One disk, placed upon another of larger diameter, will be a very good example whereby to fix in the minds of the pupils the mode of drawing cylinders of short axes.

Follow the order of the figures, in drawing the lines, and the description of drawing the cylinders in exercises D and E will indicate the method of drawing these disks.

## G. — Circular Frame.




A circular form, square in section, usually called a circular frame. The short diameter, 3–4, is level with the eye. Proceed as in drawing the cylinder or disks. It will be seen that the long diameter of the inscribed ellipse, 7–8, is not coincident with 1–2, but shifted slightly farther from the eye. This is necessary to bring the perspective right, 3–0 being nearer the eye, and of course broader than 4–9, which is the same breadth farther off, and appearing narrower by distance. Few persons ever recognize this difference in the positions of the two diameters in concentric circles; but it is essential to good drawing. In this example, the non-coincidence of the long diameters of the outer and inner ellipses is marked more plainly than it would appear in a projection, in order to impress it upon the pupil and the teacher.

## H.—Basin and Book.

The numbers of the figures, 1, 2, 3, 4, 5, 6, 7, 8, show the pupil the order in which the lines described are to be drawn; and this holds good in most of the diagrams. Observe that the thickness of the visible edge of the basin will be greatest at 1–2, and thinner at 3–4; that 1–2 is nearly twice as long as 5–6; also, that the ellipses at the bottom will be rounder and fuller than at the top. The back and front edges of the book-cover must converge upwards to the right, and the top and bottom edges upwards to the left. As a preliminary exercise, draw the basin by itself, and then the book by itself. Then let the two be placed together, as in the diagram. Where two objects are grouped, as in this example, drawing them separately first will always be advisable, the size of each when alone being greater than when drawn together.

## I. — Cup and Saucer, etc.

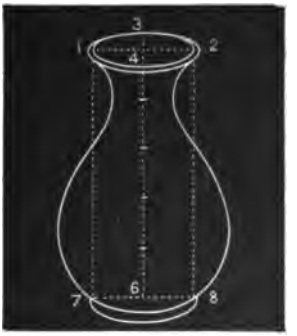
The saucer being the larger object, should be drawn first, the top of the saucer being an ellipse, the short or vertical diameter of which, continued upwards, will form the axis of the cup. The top and bowl of the cup being drawn, there only remains to draw the handle, in which it should be noticed that the top of it points towards 5, the centre of the top of the cup. As the subject is an instructive one, the process of drawing it may be varied by drawing the top of the cup first, and proceeding in the order of the figures, making a curved handle, and varying the proportion of the saucer to the cup.

The other objects may be given as exercises, and are so simple as to need no special descriptions.

## K. — Goblet.

Refer to the goblet in the Free-hand Series to see the proportions and method of drawing, with this exception, that the bowl of this goblet is broader than it is deep, and deeper than the height of the stem. The width of the base, 7–8, is the same as the depth of the bowl. In this figure it will be seen how much depends upon the fair drawing of ellipses, the stem having a series of semi-ellipses upon it, which must be intelligently drawn, or the whole character of the figure is destroyed. The base of the glass, drawn on 7–8, must be very thoroughly studied in its lines, and the profiles of the stem not allowed to reach the horizontal diameter, 7–8.

## I. — Vase




The height of the vase 4–6 is to be divided into five equal parts, and the width of the top 1–2, to be two fifths. 7–8 being also two fifths. The lip, or edge of the vase at its mouth, is drawn outside the first ellipse 1, 2, 3, 4. The straight lines 1–7, 2–8 will enable the pupil to draw the contour or profile of the vase with ease, and symmetrically. An improving exercise will be to place this vase on an inclined central line, so as to give it the effect of laying on its side, the lip of the vase touching the ground. It is of value in these lessons to change the position of objects, so as to give the pupils, when once the forms have been drawn, an opportunity of applying the principles they have learnt — to a new condition.

**M.—Pitcher and Basin.**

The basin to be drawn first. The depth 5–6, repeated twice above 5, gives a point just above the top of the pitcher, and the whole width, 1–2, is exactly the height, 6–7, whilst 3–4 is half of 1–5.

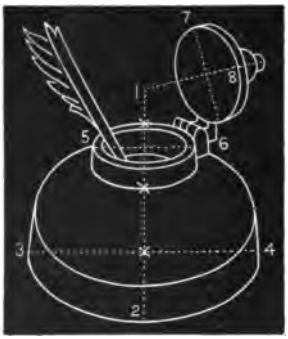
The drawing of all objects which are made on a potter's wheel, or turned in a lathe, such as the basin, and pitcher, and vase, of the last exercise, is to be carried out in the same manner. The eye cannot see objects which are circular in section (when cut at right angles to their axes), except as symmetrical forms. For this reason, a central line is indispensable to draw them accurately, and the best test which can be applied to a drawing of such objects, when the central line is oblique, is to turn the drawing, so that the line becomes vertical. If it looks right then, it will be certain to look right in its oblique position.

## N. — Egg and Egg-Cup.

The chief divisions of the proportions of this exercise will be found by dividing the vertical line 1–2 into seven equal parts, of which the width 3–4 is equal to nearly four parts. The horizontal diameters of the ellipses being placed in position on the vertical line, and the lengths of the shorter diameters marked on the vertical line, the cup will be found an easy exercise to draw — the elliptic forms being simple and in very sparing numbers.

Let another exercise be to draw the cup by itself and the egg resting by its side. A spoon in the empty egg-cup will be also a suitable form to introduce, though it is by no means an easy object to draw.

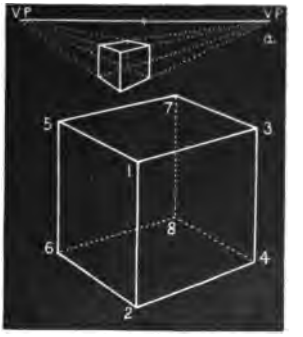
## 0. — Inkstand.




Lines 1–2 and 3–4 are equal. The spaces between the crosses on line 1–2, are equal, and that between the top cross and 1 equals one half of the division between two cross marks. If 1–2 be divided into seven equal parts, the divisions will give the principal points in the figure. The widths of 5–6, and 6–7, and 1–8, are equal to the length from 1 to the second cross from the top.

The process of drawing the figure should therefore be as follows: Draw 1–2, dividing it into seven equal parts. Through the second division, from the bottom, draw a horizontal line, 3–4, equal to 1–2. Draw 5–6 (the long diameter of the ellipse forming the opening of the ink-stand), equal to three sevenths of 1–2, in the place shown, and complete the figure by adding details, 1–8 being at an angle with 1–2, judged by the eye, and 6–7 at right angles to 1–8.

## P. — The Cube.

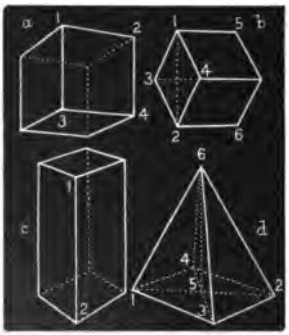



The cube is generally used to explain the principles of linear perspective, and should be drawn upon a small scale at first, to show the convergence of its horizontal edges to their vanishing points as in *a*, the two vanishing points marked as *VP*, being on a level with the eye.

It may then be drawn larger, as in the diagram. 1–2 is the first line, then 1–3, 1–5, 3–4, 5–6, the vertical edges 3–4 and 5–6 determining the widths of the visible vertical sides, lines drawn from points 3 and 5 intersecting in 7, giving the upper horizontal face — from 4 and 6 meeting in 8, forming the invisible horizontal base of the cube upon which it is supposed to be resting.

AXIOMS TO BE LEARNT. — *Axiom* 1. Parallel lines retreating from the eye converge to a point called their vanishing point. *Axiom* 2. Horizontal lines retreating from the eye, being above the eye, point downwards, or being below the eye, point upwards to the level of the eye. *Axiom* 3. Vertical lines remain vertical in all views.

## Q. — Rectangular Block and Pyramid.

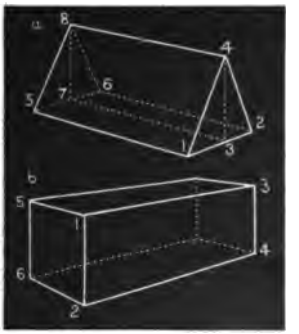



In this exercise, *a* is a cube above the level of the eye, *b* on the level of the eye. In *a*, the lines from 1–2, 3–4 must converge to a point, and the cube be finished, as in the last example. In *b*, 1–2 is vertical, 3–4 horizontal, 1–5 and 2–6, and the line from 4, converge to the right. In *c*, line 1–2 is first drawn, then proceed as with a cube. In *d*, the rectangular pyramid, the base is a perspective square, and the diagonals 1–2, 3–4 are drawn to find the centre 5, above which, at a distance equal to 1–2, is the apex 6.

The altitude of the pyramid may be varied at will, but it will be best to give it a height having some simple proportion to 1–2, the longest diagonal of the base.

A variation of *c* may be made by drawing it lying on its side, instead of standing on its end.

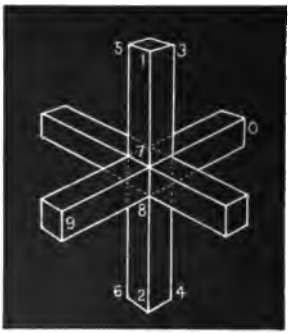
## R.—Prisms, Triangular and Rectangular.




*a.* The triangular prism, drawn by first sketching its near base, in the lines 1–2 and 3–4, base and altitude of the triangle. The one point to be careful about is that 1–3, the near half of the base, must always be longer than 3–2, the far half, and the same applies to the perspective halves of the far base, 5–6. The three edges of the prism converge to the left.

In drawing the rectangular prism *b*, the work is precisely the same as drawing the cube, only that the edges vanishing to the right are longer than in a cube. Draw the line 1–2, 1–5, 1–3, determining the length of the lines which vanish, in points 3 and 5, from 5 and 3 lines which are parallel to 1–3, 1–5, and which, therefore, appear to converge with them, meeting in the most distant visible angle of the solid. Finish as with a cube.

8.— Double Cross.




In this figure, the vertical stem must first be drawn, in the order suggested by the numerals, the points 7–8 marked upon the edge 1–2, at equal distances from those numbers, leaving the length 7–8 rather longer than 2–4. The length of the arms projecting towards the spectator must be considerably less than the length of 1–7 or 8–2, and the whole length of 9–0 should be rather less than three fourths of 1–2. The remaining arm is slightly less than 9–0.

To simplify this exercise, first draw a single cross, with the horizontal arm pointing to the right as 9–0 does. Then draw a second example with the horizontal arm pointing to the left. Lastly, a double cross as shown in the diagram.

## T. — Triangular Frame.

The near face, 1–2–4, is to be drawn like the end of the triangular prism. A point, 5, on the altitude 3–4, 5 being rather nearer 3 than 4, will be the centre of the triangle, and if lines be drawn from 1 and 2 to it, they will be the lines upon which the angles of the inscribed triangle will fall. The dotted, invisible lines of the frame will suggest how the thickness is to be drawn. The oblique parallel lines will converge as they retire, as well as the horizontal ones; thus the three lines pointing upwards from the nearest angle of the solid, will approach each other gradually, and the three which descend from the top, away from the eye, will also get nearer together as they retire.

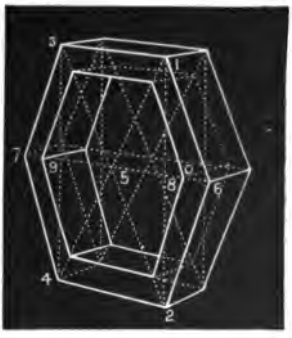
## U. — Square Frame.

Draw 1–2, 2–4, 1–3, 3–4, making 1–3 shorter than 1–2, and draw the diagonals 1–4, 2–3. Fix a point, 5, on 2–3, drawing a perpendicular line to 6. From 5 and 6 draw lines to the right, cutting the diagonals in 7 and 8, and then the vertical line 8–7.

Having drawn converging lines from 1–2, 3–4, to the left, and decided the length of 2–9, which must be less than 2–0, draw the back face of the frame, its diagonals, and the inscribed square, thus completing the figure.

A good example from this is to suppose the frame laid down flat, on one of its square faces, instead of standing upright. The same rule of drawing it will hold good, if the near bar of the frame be horizontal. But if otherwise, and an angle be nearest the eye, two vanishing points will be required, and the parallel edges of the frame will retire to right and left.

## V. — Hexagonal Frame.



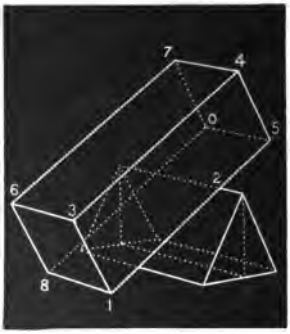

Draw the vertical line 1–2, and thus determine the position of two of the angles of the hexagonal face of the frame, then the lines 1–3 and 2–4 indefinitely, which by fixing upon the points 3 and 4 will give two more of the angles of the hexagon; 1–3 and 2–4 converge upwards to the left. Draw the diagonals 1–4, 2–3, cutting in 5, and draw an indefinite line through 5, bisecting the lines 1–2 and 3–4. Make the distance 8–6 greater than 9–7, and complete the hexagon by drawing lines 6–1, 6–2, 3–7, 4–7. Fix a point, 0, on line 6–7, and draw lines converging from it with the sides of the hexagon, always terminating in the diagonals.

It would be well before drawing these frames to draw solid slabs of the same shapes in the same positions.

# MODEL AND OBJECT DRAWING.

## PART II.

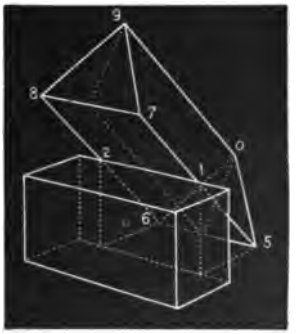
### A. — Triangular and Rectangular Prisms.




The triangular prism should be drawn first. Then the points 1 and 2 on the ground and edge of prism be marked, which will give the inclination of the square prism. Lines 1–5 and 1–3 to be then drawn. Lines 1–5, 3–4, 6–7, 8–0 will converge upwards, and lines 1–8, 3–6, 4–7, and 5–0, being horizontal and parallel with the long edges of the triangular prism and block, will converge in the same direction as those edges — to the left.

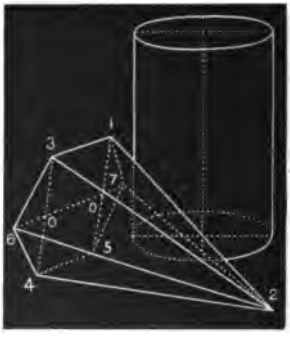
In this group the true drawing will depend upon the lines 1–5, 1–3 being at the proper angles with the ground, as that fixes the vanishing points of the square prism. If a difficulty be found in drawing the group, draw the two solids separately first, and then the group. The solids are at a great distance from the eye, and therefore the vanishing or convergence of lines is slight.

## B. — Triangular and Rectanglar Prisms.



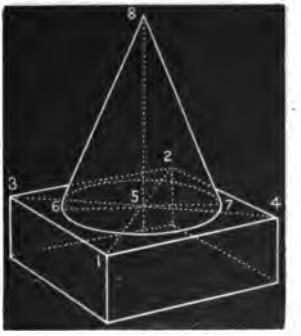

The rectangular prism being horizontal, is drawn as previously described. The two points of contact of the two prisms, 1 and 2, being fixed, draw vertical lines to cut the edge of square prism on the ground, and draw lines from these points to the right on the ground to converge with the horizontal edges of the base of the square prism. Fix points 5 and 6, and from them draw lines through points 1 and 2, which gives the inclination of the prism. Fix points 7 and 8 determining the length of the triangular prism, and 9 the apex of the triangular base. Lines 7–5, 9–0, 8–6 converge downwards towards the right. Lines 7–8, 5–6 will converge to the same point as the long edges of the square prism, being parallel with those edges. There is some help to be found in drawing this example in the accident that a line drawn through 6–1, will give point 0.

## C. — Cylinder and Hexagonal Pyramid.




Draw the cylinder as before described. Points 1–2 being assumed and the line drawn giving the highest oblique visible edge of the pyramid, the invisible base must then be drawn in the order of the numbers, 3–4 and 1–5 being each bisected by line 6–7, but not equally, and the distance between the upper portion being slightly the larger, 6–0 being greater than between 7–0. The base being drawn, making 1–5 and 3–4 converge downwards to the left, the pyramid will be finished by drawing lines from each angle to point 2, the apex. The cylinder should be drawn entirely, both visible and invisible parts, before the pyramid is attempted. The latter makes a good exercise by itself, and a pupil who is advanced beyond the rest of the class, might be set to draw it in a reversed position, *i. e.* the line 1–2 pointing downward to the left.

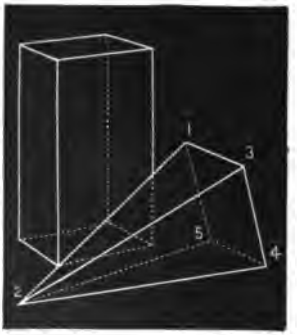
## D. — Plinth and Cone.




The plinth to be drawn like the cube or any other rectangular solid, the diagonals 1–2, 3–4 being afterwards drawn to give the centre of the upper face, 5 ; the diameter of the cone then is to be drawn slightly on the near side of this point, making 5–6 and 5–7 equal. The ellipse to be the base of the cone drawn, and the altitude 5–8 assumed, the cone is completed by drawing the tangents 8–6 and 8–7.

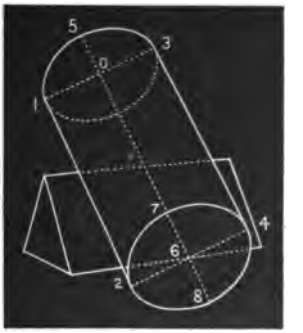
This is an exercise depending upon the correct drawing of two previous examples, namely, the cube and the cone. If they have been mastered, the present exercise will be comparatively simple. But if a difficulty be experienced in placing the two forms together, the remedy is to first draw them separately, and afterwards in one group. The height of the cone may be varied, so as to make different effects.

## E.—Rectangular (or Square) Prism and Pyramid.



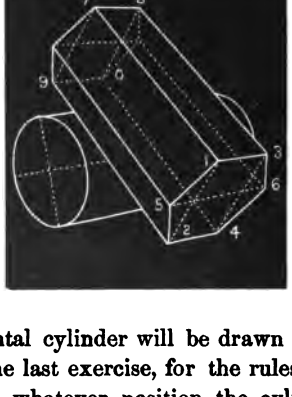

The upright block or prism to be first drawn by methods before given; the points 1–2 assumed will give one oblique edge of the pyramid. Then draw the line 1–3, one horizontal edge of the base of pyramid, 3–4 and 1–5, the oblique edges converging downwards to right, 3–1, 4–5 converging upwards to the left. Join the angles at the base to the apex, from points 1–3, 4–5, by straight lines to 2. It is a coincidence that the line 1–2 passes through the nearest angle of the vertical solid, but one which may be of use in getting the true inclination of 1–2. In finishing these geometric exercises it is advisable to leave the invisible edges dotted, as shown in the diagram. The only way of securing accuracy in such examples is to draw the whole solid in clear lines, visible or invisible, and afterwards to erase alternate parts of the latter, leaving the dotted portions to suggest what is not visible.

## F. — Cylinder and Triangular Prism.




Draw the prism first, and then the profile of the cylinder, lines 1–2, 3–4, converging from 2–4 towards 1–3, and a line 5–6, which at the near end and far end is equidistant from both, and will form the axis of the cylinder. Assume a point, 6, which is to be the centre of the visible base of the cylinder, and draw a line through it, 2–6–4, at right angles to 5–6; determine the width 7–8, the minor diameter of the near base, and draw the ellipse; at 0 draw another line, at right angles to 5–6, terminating in the lines 1–2 and 3–4. It will be the major diameter of the ellipse forming the invisible base of the cylinder; which draw and complete the figure. The line 2–4, passing through 6, does so on the edge of the triangular prism, which may be of use to notice. The cylinder does not cross the prism at right angles.

## G. — Cylinder and Hexagonal Prism.

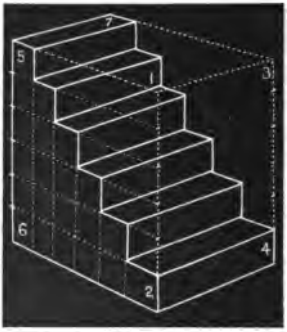



The horizontal cylinder will be drawn in the manner described in the last exercise, for the rules and methods hold good in whatever position the cylinder may be placed. The prism should be drawn much in the same way as the pyramid in C: the visible base first, the lines 1–2, 3–4 converging downwards to the left, and 5–6 converging with 1–3 and 2–4. The parallel edges of the prism, from each angle of the base, will converge as they retire, and the invisible base will be a repetition of the visible one. To ascertain in what direction each line will tend, it is only requisite that the teacher should compare it with other lines already drawn, to which it is parallel, and draw it converging to the same vanishing point. It should be constantly impressed on the pupils that parallel lines, retreating from the eye, *converge*.

## H. — Open Box.

The body of the box must be drawn first, as though it were a rectangular block of wood, and the projecting batten at the bottom be added outside the lines of the box. The thickness of the wood at the top to be then added. The lid, in its principal lines, is a continuation of the vertical outlines of the box, the depth of the lid being added, to the right, and its long lines vanishing to left with the long edges of the box. In this exercise, which is an example of angular perspective, two vanishing points will be used, both being on the level of the eye. To these two points, all the lines of the box, except the vertical lines, will converge, either to right or left. To get the position of the key-hole, diagonals of the front of the box should be drawn, which will give the perspective centre of the front. Above this centre is the key-hole. The same may be done to obtain the true position of the handle.

## I. —Flight of Six Steps.




The near height of the flight being marked as at 1–2, the whole block should be drawn, namely, 1–2, 3–4, 5–6–7, treating it as a block of stone, out of which the steps have to be cut. The line 1–2 divided into six equal parts, also 3–4 into six. The line 2–6 to be divided into six parts, decreasing gradually towards 6. Divide 5–6 into six equal parts and draw lines from the equal divisions on 1–2 to those on 5–6. If vertical lines be drawn from the divisions on 2–6 to intersect the horizontal lines above, they will form the risers of the steps, and the horizontal lines will give the treads. The opposite ends of the steps will be finished in like manner.

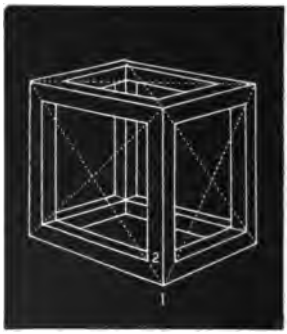
Three steps treated in this way will be a good preparation for the above exercise, the block being first made, and its upright edges divided into three equal parts, the corresponding line to 2–6 divided into three parts decreasing towards 6.

## K. — Vase.

The central line 1–2 and major diameter 3–4 of the mouth of the vase being drawn, all there is to be observed in drawing the form is, that the ellipses get gradually fuller towards the base of the vase, *i. e.*, their minor diameters get longer in proportion to their major diameters.

It is well to sketch horizontal lines to form the major diameters of the ellipses, so as to secure that the two sides shall be symmetrical, and the curves of the ellipses at their extremities be evenly balanced. That is especially advisable at the base of the vase, and the greater part of its elliptic shape should be sketched, the curved outline of the base being made tangential to the curve of the base.

## L.—Skeleton Cube.




**First draw this subject as a solid cube. Then draw the diagonals of each visible face. Remember that the angles of the inscribed squares of the visible faces will fall on these diagonals. The dotted lines show the method of progress. The distance 1–2 being marked, deciding the thickness of the wood, lines drawn from 2 converging upwards with the horizontal edges of the cube, will give the angles of the vertical sides of the inscribed squares. This is an exercise which, like the ellipse, may be repeated many times to great advantage.**

**It is puzzling at first, and the probability is that the pupils may draw it several times before all the lines are observed. The cube drawn in any position may be thus converted into a skeleton cube, the accuracy of the perspective depending upon the convergence of the lines horizontally, so as to cut the diagonals truly.**

## M. — Water Bottle.

The two lines 1–2, 3–4 are the most important in this exercise, and must therefore be first drawn. The neck and body of the bottle should be drawn as though there were no projections or lines upon them, which, together with the handle, must be added afterwards.

The ellipse forming the top of the saucer and then its edge thickness, and the base on which it rests will be the first part of the exercise. Then the neck and body of the bottle, the first being composed of vertical lines, and the second of a sphere or circle. The parallel elliptical lines on the surface of the neck and body to be drawn before the pointed ornament on the latter, and the handle drawn last.

This example will be suitable to give as an advanced or examination exercise, to be drawn on a large scale by the pupils on the blackboard, without other instruction than the height of the vertical line stated in figures.

N. — Journal.

This example should be drawn as a rectangular solid, the projecting top and base being added. The diagonals of the front face will give the centre, and also indicate where the oblong forms for the month and day should be placed on the front of the register. The four turnpins on the right face are drawn last, and it should be noticed how they point upwards to the left, the four elliptical ends being the perspective view of the circular forms of which they are composed.

This example is, from its decidedly perspective character, suitable for individual pupils to practice on the board, on a large scale, after once drawing it a moderate size in the text book or blank book.

## 0.—Silver Tankard.

The central line, 1–2, the diameter of the open top 3–4, the diameter of the bottom, 5–6, to be first drawn, and then the upper ellipse. The top and bottom have rims whose thickness must be shown projecting beyond the body of the tankard. The handle, in which some delicate perspective occurs, must be drawn with considerable care, after the other parts are finished. The scroll ornament on the body of the tankard may be drawn or omitted, at the discretion of the teacher, the only noticeable feature being that it is symmetrical, the end of the balancing curve to that shown being discernible behind the handle. A variety of this form may be obtained by increasing the height of the tankard, and lengthening the handle. In that case, the opening at the top must be flatter, or the base rounder.

## P.—Tin Coffee-pot.

The body and circular lines and projections on it being symmetrical, a central line is first required, 1–2, and the widths 3–4 and 5–6 of the top and bottom of the pot. The side lines 3–5 and 4–6 give the inclined outlines of the form, and the lid and base may then be drawn symmetrically on the body of the pot. The handle and spout come last. Care must be exercised in getting the proportionate widths of 3–4 and 5–6 to 1–2, judging them by the eye; that being fairly settled, the rest of the exercise is simple. Before drawing the handle the inclined lines which show the joints of the tin must be drawn, so that the handle may fit on to the lines.

Q. — Earthenware Tea-pot.

**Draw the central vertical line 1–2 as in the last example, and determine the position and lengths of 3–4, 5–6. In this case the curve 5–2–6 is not a semi-ellipse, but a portion of the rounded surface of the tea-pot, which hides the circular base. The spout and handle are drawn after the body, top, and lid are completed. In drawing the spout, the mouth and place where it is joined to the pot should be fixed, and the shape sketched; the outline from one to the other may then be accurately traced. In drawing the handle, the curve which starts immediately opposite 3 should be the first drawn, the two outer lines showing the thickness of the handle being drawn nearly parallel with it.**

## R. — Round Table.

Draw this in the order of the figures, which will give the principal proportions, the width of the upper ellipse being rather greater than the length of line 1–2. Draw the dotted lines first, and thus decide the principal features; the top of the table being completed, will give an opportunity to fix the width of the top of the pillar, where it appears to touch the lower moulding of the table top, and the lower width is settled by the dotted line above 5–6. Having drawn the circular mouldings, which are at the base of the pillar, the base of the table with its feet can be added.

## 8. — Chair.

The lower part, seat and legs, will be something like the drawing of the skeleton cube, the stuffed seat alone preventing the remainder of the skeleton being seen. The figures 1–2, 3–4, 5–6, 7–8, will show the order in which the leading lines are to be drawn. The fault to be avoided is making the legs and bars too thick. The frame-work of the chair must be carefully worked out, so as to get the right perspective effect, the parallel lines converging to right and left, and gradually, before the seating is drawn. Reverse the position of the chair, for another exercise, putting the back towards the left, and add another bar to it, to see whether the principle of drawing these features has been caught.

## T. — Kitchen Table and Ewer.

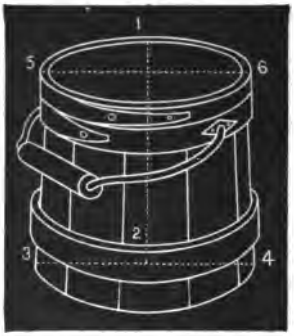
Draw the rectangular top of the table, 1–2, 3–4, and then the hanging leaves, noticing that the angles of the top will be in the same line as the under faces of the leaves, at 1 and 2. The lines forming the outer angles of the table legs will be vertical, each of the other edges inclining towards them. The ewer is to be drawn in the same way as the vase in exercise K.

The table should be drawn as though the whole of the top could be seen, and when it is satisfactory, the ewer can be placed upon it, drawing the central line first, and the horizontal axes of the ellipses, which determine the width of the principal parts, secondly. The two objects may also be taken as separate lessons, and might then be drawn in conjunction, as a third lesson.

## U. — Chamber Candlestick.

The line 1–2 to be divided into six equal parts, and 3–4 to be equal to five of those parts, crossing the vertical at two parts from 2. The third part from 2 gives the back line of the ellipse forming the top of the bowl, and the fourth, the top of the cup of the candlestick. The width of the candlestick, thickness of candle, position of handle and extinguisher to be an exercise of the eye. The two lines 1–2, 3–4 being drawn and the divisions on 1–2 marked, the principal proportions will be secured, and the bowl of the candlestick should be then represented, the large ellipse having its long diameter on 1–2, being the first curve to be drawn. A central line might be drawn through the extinguisher, to secure that its oblique sides shall incline equally on the two sides.

## V.—Bucket.




The lines 1–2, 3–4, are equal in length, 5–6 being slightly shorter than 3–4. The top or lid of the bucket being drawn, and also the visible portion of the base, on 3–4, the oblique sides may be added. It must be noticed that the hoops project beyond the body of the bucket, their thicknesses being shown on the outline, the handle will be drawn as indicated, the wooden part which the hand grasps first, and afterwards the metal portion.

The lines which mark the divisions of the wooden staves must incline slightly towards the central line, upwards. It may be observed that they are not symmetrically arranged, and may be put in any position, so that their width decreases towards the profile of the bucket.

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